

GAMMA-COLL
INNOVATIVE TECHNIQUES FOR TREATMENT OF COLLAGEN
MATRICES WITH GAMMA RADIATIONS AS GREEN
ALTERNATIVE

Program: P1 – Development of the national R&D system

Subprogram: 1.1 Human resources,

Project type: Postdoctoral research project

Project code: PN-III-P1-1.1-PD-2021-0189

Financing contract: PD 71/2022

Contractor: National Research and Development Institute for Textiles and Leather - I.N.C.D.T.P. Bucharest, Division: Leather and Footwear Research Institute - I.C.P.I.

Start date of contract: 01.04.2022

End date of contract: 31.03.2024

Project duration: 24 months

Total value of the contract: 250.000,00 lei

Project director: Dr. Maria Stanca, CS III

General objective of the project:

The main objective of the Gamma-Coll project is to investigate changes in collagen due to the ions and free radicals generated by gamma radiation and its influence on leather in various chemical environments, in order to develop experimental models for new ecological technologies. The estimated environmental impact refers to total reduction of total dissolved solids and chlorides from effluents, reduction of processing time and obtaining finished products of higher quality, free of potential allergens.

The specific objectives of the project are:

- Developing a process for preserving raw hides, wet-blue/ wet-white or crust hides using gamma radiations
- Developing a process for crosslinking collagen matrices
- Developing an experimental model for ecological leather tanning in order to obtain higher quality products.

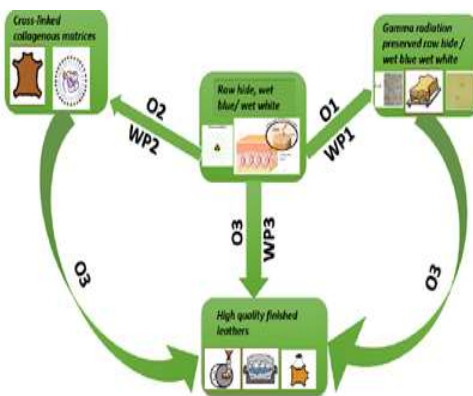


Fig.1 Flowchart of project objectives

The GAMMA-COLL project contributes to developing unconventional, ecological techniques for the preservation of raw, wet-blue and crust hides or for crosslinking collagen using gamma radiations, as ecological alternative.

Stage I: *Developing an ecological process for the preservation of raw, wet-blue /wet-white or crust hides by gamma radiation.*

The objective of stage I of the GAMMA-COLL project was to establish the optimal dose of gamma radiation for the preservation of hides in various stages of processing. In order to achieve this objective, hides were irradiated at different doses and then characterized.

Raw hides were irradiated at 10, 20 and 25 kGy to establish the optimal dose for hide preservation. Irradiated raw hides and the non-irradiated control were vegetable tanned.

Wet-blue and crust hides were irradiated at 5, 10 and 15 kGy to establish the optimal dose for hide preservation.

Raw, wet-blue and crust hides were analysed physico-chemically, physico-mechanically and by spectroscopic methods.

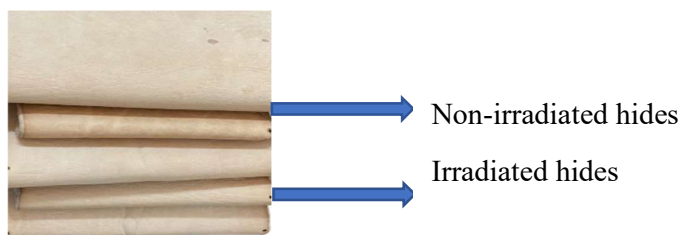


Fig. 2 Vegetable tanned leather after gamma irradiation

Results:

Web of Science-indexed journal articles: Maria Râpa, Traian Zaharescu, Laura Mihaela Stefan, Carmen Gaidau, Ioana Stanculescu, Rodica Roxana Constantinescu and Maria Stanca, Bioactivity and Thermal Stability of Collagen–Chitosan Containing Lemongrass Essential Oil for Potential Medical Applications, *Polymers* 2022, 14, 3884.

Daniela Bala, Iulia Matei, Gabriela Ionita, Dragos-Viorel Cosma, Marcela-Corina Rosu , Maria Stanca, Carmen Gaidau, Maria Baleanu, Marian Virgolici and Ioana Stanculescu, Luminescence, paramagnetic and electrochemical properties of copper oxides-decorated TiO₂/graphene oxide nanocomposites, -pending publication

Patent application: Stanca Maria, Ionita Elena Gabriela, Stanculescu Ioana-Rodica, Cutrubinis Mihalis, Process of crosslinking hides by gamma irradiation, A/00741/17.11.2022